

- pivot point 705 thus increasing the overall leverage of the finger operated lever 702 in actuating the piston 718a of the clutch master cylinder 718. Additionally, as the end point of the threaded adjustor 712 moves closer to pivot point 705, the tip of the clutch cylinder actuator 716 is moved further away from the centre line of the master clutch cylinder 718. This increases free play to the clutch function. As the finger operated lever 702 is moved in the direction marked by the arrow B, it also pushes on the brake free play adjustor 720 which, in turn, pushes the brake push rod 722 which takes up the free play in the brake free play adjustor 720. Accordingly, it will be appreciated that shifting the finger operated lever 702 in the direction marked by the arrow B, increases the leverage ratio to the clutch function, introduces free play in the clutch operation, takes up the free play in the brake operation and can be used to operate the brake function.
- 15 Shifting the finger operated lever 702 in the direction marked by the arrow B therefore means that although it is easier to operate the clutch function, more movement of the finger operated lever 702 in the direction marked B is required to achieve the same clutch function.
- 20 From the above it will be appreciated that the user has the ability to change the function of the inward movement (i.e. movement towards the handlebar 708) of the finger operated lever 702 during use of the actuator 700. For example, as the finger operated lever 702 is moved towards the handlebar 708 with the lever 702 in the position marked by the arrow A, first clutch operation will be achieved. However, if the finger operated lever 702 is then moved in the opposite direction (i.e. in the direction of the arrow marked B) brake function will be first initiated. The actuator 700 can be adjusted so that both brake and clutch function can be achieved with rear brake bias if the finger operated lever 702 is moved in the direction marked by the arrow B.

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Figure 19 is a chart depicting possible operational and functional characteristics of the combined brake and clutch actuator 700 shown in Figures 17 and 18. These characteristics can be changed by making various adjustments to the

REPLACED BY
ART 34 AMDT

- 52 -

Once the ball and spring detent system 1232 has locked the brake actuation arm 1214, further travel of the lever 1201 towards the handlebar 1206 does not move the brake actuation arm 1214 until a brake initiation adjustor 1250 contacts a portion of the brake actuation arm 1214. At this point, any further
5 travel of the lever 1201 towards the handlebar 1206 will operate the brake function.

If the lever 1201 is released the brake system pressure returns the brake master cylinder piston 1222 most of the way back to the start of its stroke. The
10 brake master cylinder piston 1222 is pulled over the ball spring detent and back to an open to reservoir position by the brake actuation arm return spring 1254.

It will be appreciated that in Figure 47 no return spring is shown in the brake master cylinder 1216. However, it is envisaged that in some applications a
15 return spring may be desirable.

In the arrangement shown in Figures 47 to 50, the return of the lever 1201 to its most displaced position from the handlebar 1206 is facilitated by the clutch master cylinder piston return spring 1260. Furthermore, the profile of the cam
20 surface 1201a is tailored to ensure there is sufficient force to return the lever 1201 to its position away from the handlebar 1206. This, together with the brake actuation arm return spring returns the brake master cylinder piston 1222 to the open port to reservoir position.

25 If the foot pedal 1226 is depressed, the pedal operation cable 1224 causes the brake actuation arm 1214 to rotate around the main pivot 1204, thus operating the brake function. Also, at a point determined by an anti-stall adjustor 1270, the lever 1201 is caused to rotate around the main pivot 1204 thereby operating the clutch function. The purpose of this operation of the clutch function is to
30 help prevent stalling of the motor vehicle due to any brake function lock.

For the purpose of clarity, the mount is not shown in drawings 47 to 50. However, the main pivot 1204, the clutch rocker arm pivot and the ball spring

REPLACED BY
ART 34 AMDT

Claims

1. A dual function handlebar mounted actuator including means for
5 operating a first function and means for operating a second function, said first
and second function operating means being arranged for activation by
movement of a hand operated lever arrangement and wherein said first and
second function operating means are linked so that a combined first and second
function can be activated.
- 10 2. A dual function handlebar mounted actuator according to claim 1 wherein
said first and said second functions can be operated separately upon movement
of the hand operated lever arrangement.
- 15 3. A dual function handlebar mounted actuator according to claim 1 or claim
2 wherein the first function operating means and the second function operating
means are mechanically linked together.
- 20 4. A dual function handlebar mounted actuator according to any of the
preceding claims wherein said first function operating means is activated by a
first action of the user to said lever arrangement and said second function
operating means is activated by a second action of the user to said lever
arrangement.
- 25 5. A dual function handlebar mounted actuator according to claim 3 wherein
said first and second actions of the user are respective first and second
movements of the user's hand or fingers on or against said lever arrangement.
- 30 6. A dual function handlebar mounted actuator according to claim 5 wherein
the first and second actions include pulling the lever arrangement, pushing the
lever arrangement, sliding the lever arrangement, rotating the lever
arrangement or any combination of such movements.

7. A dual function handlebar mounted actuator according to any one of the preceding claims further including first and second actuator members, said first actuator member being arranged to activate said first function when said first
5 operating means is activated and said second actuation means being arranged to activate said second function when said second operating means is activated.
8. A dual function handlebar mounted actuator according to claim 7 wherein
10 the first and second actuator members each include adjustment means arranged to enable variation of the point at which operation of said first and second functions occurs.
9. A dual function handlebar mounted actuator according to any one of the
15 preceding claims further including adjusters for varying the point at which the combined function is operated.
10. A dual function handlebar mounted actuator according to any one of the preceding claims further including indication means to indicate to the user when
20 the second function is initiated.
11. A dual function handlebar mounted actuator according to claim 10 wherein the indication means provides a tactile indication to the user.
12. A dual function handlebar mounted actuator according to any one of the preceding claims wherein said lever arrangement includes a lever means having a first portion and a second portion, said lever means being arranged so that movement of the first portion initially operates a first function, movement of the second portion initially operates a second function and movement of the
25 lever means from a point between the first and second portions operates both
30 the first and the second functions.

13. A dual function handlebar mounted actuator according to claim 12 wherein continued movement of either the first portion or the second portion of the lever means will respectively result in the operation of the second or the first functions so that the combined function is operated.

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14. A dual function handlebar mounted actuator according to claim 13 further including a slide member arranged to enable the user's fingers to shift more readily from said first portion to said second portion of the lever means.

10 15. A dual function handlebar mounted actuator according to any one of the preceding claims further including a friction adjustor to enable the degree of friction between the second operating means and a portion of the actuator to be adjusted so that the second operating means can be locked in a position whilst the first function operating means is varied.

15

16. A dual function handlebar mounted actuator according to any one of the preceding claims wherein the first function is a clutch function and the second function is a brake function.

20 17. A dual function handlebar mounted actuator including a master cylinder actuator and a bias valve, said master cylinder actuator being arranged so that actuation thereof results in a force application to the bias valve which is arranged to operate a first function, a second function or both the first and the second functions.

25

18. A dual function handlebar mounted actuator according to claim 17 wherein the first function is a clutch function and the second function is a brake function.

30 19. A dual function handlebar mounted actuator according to claim 18 further including a bias valve actuator arranged to control a bias valve so as to bias the valve to operate the clutch function, the brake function or the combined clutch and brake function.

20. A dual function handlebar mounted actuator according to claim 19 wherein the bias valve includes a piston that is arranged to operate the clutch function and the brake function.

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21. A dual function handlebar mounted actuator according to claim 20 wherein the bias valve is connected to a clutch arrangement including a clutch port and a clutch return port and a brake arrangement including a brake port and a brake return port.

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22. A dual function handlebar mounted actuator according to claim 21 arranged so that as the piston of the bias valve is actuated, the clutch function is operated, the brake return port is closed, the brake function is operated and the clutch port is shut.

15

23. A dual function handlebar mounted actuator according to claim 22 wherein following shutting of the clutch port, further travel of the piston of the bias valve will open the clutch return port.

20 24. A dual function handlebar mounted actuator according to claim 23 further including adjustment means arranged to provide a pre-set bias to the bias valve.

25 25. A dual function handlebar mounted actuator according to any one of claims 19 to 24 wherein the master cylinder actuator and bias valve actuator are formed as separate lever means which are pivotally connected together.

30 26. A dual function handlebar mounted actuator according to any one of claims 19 to 24 wherein the master cylinder actuator and bias valve actuator are formed as a combined lever means.

27. A dual function handlebar mounted actuator according to claim 26 wherein said lever means includes a first portion, and a second portion, said

lever means being arranged so that movement of the first portion operates said master cylinder actuator, movement of the second portion operates said bias valve actuator and movement of the lever means between the first and second portions operates both the master cylinder actuator and the bias valve actuator.

5

28. A dual function handlebar mounted actuator according to claim 26 wherein the master cylinder actuator and bias valve actuator include as a single lever means, said lever means being arranged to move in a first direction to operate the master cylinder actuator and in a second direction to operate the bias valve actuator.

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29. A dual function handlebar mounted actuator including a lever means, means for operating a first function and means for operating a second function, said first and second operating means being linked so that activation of the lever means in a first direction activates said first function operating means and further activation of said lever means in said first direction to an activation point activates said second function operating means.

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30. A dual function handlebar mounted actuator according to claim 29 wherein activation of said lever means in a second direction activates said second function operating means and continued activation of said lever means in said second direction activates said first function.

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31. A dual function handlebar mounted actuator according to claim 29 or claim 30 wherein said first function is a clutch function and the second function is a brake function.

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32. A dual function handlebar mounted actuator according to anyone of claims 29 to 31 further including adjustment means for adjusting the brake function activation point and/or adjustment means for adjusting an activation point of the clutch function.

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REPLACED BY
ART 34 AMDT

- 63 -

33. A dual function handlebar mounted actuator according to claim 32 wherein the adjustment means includes an adjustable activating rod connected to the lever means and an adjustor cam.
- 5 34. A dual function handlebar mounted actuator according to claim 33 wherein the adjustment means is arranged so that the activating rod can be adjusted so that the positioning of the adjustor cam is varied, thereby adjusting the activation point of the brake function.
- 10 35. A dual function handlebar mounted actuator according to any one of claims 29 to 34 wherein the lever means provides a mechanical link between the first function operating means and the second function operating means.
36. A dual function handlebar mounted actuator according to claim 35
15 wherein actuation of the lever means in the second direction increases the leverage to the clutch function and/or increases free play in the clutch arrangement so as to delay operation of the clutch function.
37. A dual function handlebar mounted actuator according to any one of
20 claims 29 to 36 wherein actuation of the lever means in the first direction requires the user to move the lever means in an inwards direction and actuation of the lever means in the second direction requires the user to move the lever means in a sideways direction either right or left.
- 25 38. A dual function handlebar mounted actuator according to any one of claims 29 to 36 wherein actuation of the lever means in the first direction requires the user to move the lever means in an inward direction towards a handlebar and actuation of the lever means in the second direction requires the user to move the lever means in a downward direction.
- 30 39. A dual function handlebar mounted actuator for use with a vehicle having an engine, said actuator including a hand operated lever means for operating a brake function and a clutch function, means for sensing the R.P.M of the engine

REPLACED BY
ART 34 AMDT

and wherein said lever means is arranged so that when the sensed R.P.M is above a first predetermined value movement of a first portion of the lever means will result in operation of the brake function and wherein when the sensed R.P.M. is below the first predetermined value movement of the first
5 portion of the lever means will result in operation of the brake function and the clutch function so as to prevent stalling of the engine.

40. A dual function handlebar mounted actuator according to claim 39 wherein initial movement of a second portion of the lever means results in
10 operation of the clutch function independently of the brake function, and that further movement of the second portion of the lever means results in operation of both the clutch function and the brake function.

41. A dual function handlebar mounted actuator according to claim 39 or
15 claim 40 further including indication means arranged to signal to the user that the brake function has been initiated when the second portion of the lever means is moved.

42. A dual function handle bar mounted actuator according to claim 41
20 wherein the indication means includes a tactile indication to the user.

43. A dual function handlebar mounted actuator according to any one of claims 39 to 42 further including adjustment means arranged to adjust the point at which the clutch function is activated.

25

44. A dual function handle bar mounted actuator according to any one of claims 39 to 43 further including adjustment means arranged to adjust the point at which the brake function is activated.

30 45. A dual function handlebar mounted actuator according to any one of claims 39 to 44 further including a brake function control unit arranged to lock on the brake function when the engine R.P.M. is above the first predetermined value.

46. A dual function handlebar mounted actuator for a vehicle having an engine including a hand operated lever means and a selector means, said lever means arranged so that when the selector means is in a first position (C) movement of the lever means in a first direction (A) activates a switch so that a clutch function is operated and continued movement of the lever means in the first direction operates a brake function, said lever means further arranged so that movement of the lever means in a first direction when the selector means is in a second position operates the brake function and will also operate the clutch function when the R.P.M. of the vehicle's engine falls below a predetermined value.

47. A dual function handlebar mounted actuator according to claim 46 wherein the selector means includes a spindle arranged for connection to said lever means.

48. A dual function handlebar mounted actuator according to claim 47 wherein the spindle is mounted for rotational and sliding movement.

49. A dual function handlebar mounted actuator according to anyone of claims 46 to 48 further including adjustment means arranged so that when the selector means is in the second position (B) and the lever means is moved in the first direction the point of activation of the brake function and the clutch function can be adjusted.

50. A dual function handlebar mounted actuator according to any one of claims 46 to 49 further including a control unit, said control unit including a brake solenoid, means for sensing the R.P.M of the engine and a switch arranged to activate when the R.P.M of the vehicle's engine falls below the predetermined value.

51. A dual function handlebar mounted actuator according to claim 50 arranged so that when the R.P.M of the engine falls below a predetermined

- 66 -

value the R.P.M switch is activated so as to open the brake solenoid and operate the clutch function to prevent stalling of the engine.

52. A dual function handlebar mounted actuator according to any one of
5 claims 46 to 51 wherein the force required for operation of the clutch function and/or the brake function can be partially or fully provided by operation of a foot pedal.

53. A dual function handlebar mounted actuator including hand operated
10 lever means arranged for movement in a first direction (A), said movement serving to operate a first function, said lever means being further arranged for movement in a second direction (B), said movement serving to operate a second function, and wherein the actuator further includes a combined function means arranged so that when said lever means is moved in said first direction
15 to an initiation point said combined function means causes said lever means to also move in said second direction so that both the brake function and the clutch function are operated.

54. A dual function handlebar mounted actuator according to claim 53 further
20 including adjustment means arranged to adjust the initiation point at which the lever means is caused by said combined function means to move in the second direction.

55. A dual function handlebar mounted actuator according to claim 53 or
25 claim 54 wherein said combined function means is a cam means.

56. A dual function handlebar mounted actuator according to any one of
claims 53 to 55 wherein the lever means can also be moved in the second direction upon operation of a foot pedal.

30

57. A dual function handlebar mounted actuator wherein the first function is a clutch function and the second function is a brake function.

REPLACED BY
ART 34 AMDT

58. A dual function handlebar mounted actuator including lever means arranged for movement in a first direction, said movement in said first direction operating a first function, and wherein when said lever means is moved in said first direction so as to reach a second function initiation point operation of a
5 second function is initiated, said actuator further including means for operating said second function independently of the first function.

59. A dual function handlebar mounted actuator according to claim 58 wherein continued operation of said second function operating means to a first
10 function initiation point will cause operation of the first function.

60. A dual function handlebar mounted actuator according to claim 58 or claim 59 further including adjustment means arranged to adjust the second function initiation point and/or the first function initiation point.
15

61. A dual function handlebar mounted actuator according to any one of claims 58 to 60 wherein the first function is a clutch function and the second function is a brake function.

20 62. An actuator arrangement including a lever movable between a first and a second position and a master cylinder having a piston, said lever being arranged so that when it is moved towards said second position said piston is driven from an initial position to thereby increase pressure within the master cylinder and wherein when said lever is released the pressure within the master
25 cylinder is arranged to return the piston towards the initial position, said piston being returned fully to the initial position upon movement of the lever to the first position.

30 63. An actuator arrangement according to claim 62 further including an adjustor member connected between the lever and the master cylinder, said adjustor member being arranged to enable some free play between the movement of the lever and movement of the piston of the master cylinder.

REPLACED BY
ART 34 AMDT

64. An actuator arrangement according to claim 62 or claim 63 arranged to be operated by a user's hand or by foot operation or a combination thereof.

65. A dual function handlebar mounted actuator including a lever means
5 pivotally connected to a mount, said lever means arranged for connection to a first function operating means, actuation means pivotally connected to said mount and arranged for connection to a second function operating means, said
10 ~~lever means and said actuation means being arranged so that when said lever~~
means is pivoted to a first point a first function will be operated and when said
lever means is pivoted to a second point the first function and a second function
will be operated.

66. A dual function handlebar mounted actuator according to claim 65
15 wherein the actuation means is connected to an operating member which is
arranged to pivot the actuation means about said pivot point to operated said
second function.

67. A dual function handlebar mounted actuator according to claim 65 or
20 claim 66 wherein the lever means includes a cam surface against which a
follower attached to the first function operating means is arranged to run.

68. A dual function handlebar mounted actuator according to claim 67
25 wherein the first function operating means includes a first function cylinder and
a first function piston and wherein the cam surface of the lever means is profiled
so that once said first function is operated further pivotal movement of said lever
means will result in substantially no movement of said first function piston.

69. A dual function handlebar mounted actuator according to any one of
30 claims 65 to 68 further including first adjustor means for adjusting the point at
which the second function is operated upon pivotal movement of the lever
means.

70. A dual function handlebar mounted actuator according to claim 69 wherein the first adjustor means includes a threaded member mounted on the lever means having a portion arranged to contact the actuation means so as to initiate pivotal movement of the actuation means.

5

71. A dual function handlebar mounted actuator according to any one of claims 65 to 70 further including a spindle mounted on the lever means.

72. A dual function handlebar mounted actuator according to any one of
10 claims 65 to 71 further including second adjustor means for adjusting the point at which the first function is operated upon pivotal movement of the actuation means.

73. A dual function handlebar mounted actuator according to claim 72
15 wherein the second adjustor means includes a threaded member mounted on the actuation means having a portion arranged to contact the lever means so as to initiate pivotal movement of the lever means.

74. A dual function handlebar mounted actuator according to any one of
20 claims 65 to 74 wherein the first function is a clutch function and the second function is a brake function.

75. A dual function handlebar mounted actuator including a primary lever, a
secondary lever, a pull member, an arm member, first function operating means
25 and second function operating means, said primary and secondary levers being pivotally connected together at a first pivot point and said secondary member and said arm member both being arranged for pivotal movement about a second pivot point, and wherein said pull member is connected between said primary lever and said arm member so that when said primary lever is pivoted
30 about said first pivot point the arm member is caused to pivot about said second pivot point and said first function operating means is caused to operate said first function and when said primary lever is moved in a first direction from a point adjacent the first pivot point the secondary lever is caused to pivot about

- 70 -

said second pivot point and said second function operating means is caused to operate said second function.

76. A dual function handlebar mounted actuator according to claim 75 further including a first and second adjustors, said first adjustor being arranged so that when said arm member is caused to pivot about the second pivot point said first adjustor contacts a portion of said secondary lever so as to cause pivotal movement of said secondary lever about said second pivot point, said second adjustor being arranged so that when said secondary lever is caused to rotate the second adjustor will contact a portion of the arm member so as to cause pivotal movement of said arm member about said second pivot point.

77. A dual function handlebar mounted actuator according to claim 76 wherein the first and second adjustor are adjustable so that the point at which they contact the respective secondary lever and arm member can be adjusted thereby adjusting the activation points of the first and second functions.

80. A dual function handlebar mounted actuator according to any one claims 76 to 79 wherein said first function is a brake function and the second function is a clutch function.

81. A dual function handlebar mounted actuator including a main lever, a first function operating arm and a second function operating arm, said main lever being pivotally connected to said first function operating arm and wherein movement of said first function operating arm in a first direction results in operation of a first function, movement of said main lever in a second direction results in operation of a second function and continued movement of said first function operating arm in said first direction results in operation of both the first and second functions.

82. A dual function handlebar mounted actuator according to claim 81 wherein said first and second function operating arms are arranged for pivotal movement about a first pivot point.

REPLACED BY
ART 34 AMDT

- 71 -

83. A dual function handlebar mounted actuator according to claim 82 wherein the main lever is attached to a cam arrangement arranged to contact the second function operating arm so that when the main lever is moved in the second direction the cam arrangement causes the second function operating arm to pivot about the first pivot point and operate the second function.

84. ~~A dual function handlebar mounted actuator according to any one of~~ claims 81 to 83 wherein the first function operating arm includes a cam surface arranged to contact a cam roller arrangement such that movement of the first function operating arm in the first direction causes the cam roller arrangement to operate the first function.

85. A dual function handlebar mounted actuator according to any one of claims 81 to 84 wherein continued movement of the main lever in the second direction results in operation of both the second function and the first function.

86. A dual function handlebar mounted actuator according to any one of claims 81 to 85 further including a foot control pedal arranged such that activation of the foot control pedal results in operation of the second function.

87. A dual function handlebar mounted actuator according to claim 86 wherein activation of the foot control pedal causes the second operating arm to pivot about the first pivot point so as to operate the second function.

88. A dual function handlebar mounted actuator according to any one of claims 81 to 87 wherein the first function is a clutch function and the second function is a brake function.

89. A dual function handlebar mounted actuator according to anyone of claims 1 to 61 and claims 65 to 88 arranged so that operation of said first function or said second function can also be activated by a foot operated control.

REPLACED BY
ART 34 AMDT

90. A dual function handlebar mounted actuator according to anyone of claims 1 to 16 arranged so that once the first function is operated any additional force applied to the lever arrangement by the user's hand facilitates operation of the second function.

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91. A dual function handlebar mounted actuator according to anyone of claims 29 to 61 or claims 65 to 74 arranged so that once the first function is ~~operated any additional force applied to the lever means by the user's hand~~ facilitates operation of the second function.

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92. A dual function handlebar mounted actuator according to anyone of claims 62 to 64 arranged so that once the first function is operated any additional force applied to the lever by the user's hand facilitates operation of the second function.

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93. A dual function handlebar mounted actuator according to anyone of claims 75 to 80 arranged so that once the first function is operated any additional force applied to the primary lever by the user's hand facilitates operation of the second function.

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94. A dual function handlebar mounted actuator according to anyone of claims 81 to 88 arranged so that once the first function is operated any additional force applied to the main lever by the user's hand facilitates operation of the second function.

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95. A dual function handlebar mounted actuator according to any one of claims 1 to 16 wherein the first function is a clutch function and once the clutch function is initiated so as to disengage a clutch of a vehicle, any further travel of the lever arrangement requires little or no additional force to be applied to the lever arrangement by a user.

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96. A dual function handlebar mounted actuator according to any one of claims 29 to 61 or claims 65 to 74 wherein the first function is a clutch function

and once the clutch function is initiated so as to disengage a clutch of a vehicle, any further travel of the lever means requires little or no additional force to be applied to the lever arrangement by a user.

5 97. A dual function handlebar mounted actuator according to any one of claims 62 - 64 wherein the first function is a clutch function and once the clutch function is initiated so as to disengage a clutch of a vehicle, any further travel of the lever requires little or no additional force to be applied to the lever arrangement by a user.

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98. A dual function handlebar mounted actuator according to any one of claims 75 - 80 wherein the first function is a clutch function and once the clutch function is initiated so as to disengage a clutch of a vehicle, any further travel of the main lever requires little or no additional force to be applied to the lever arrangement by a user.

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99. A dual function handlebar mounted actuator according to any one of the preceding claims wherein an overlap between the first and second functions can be varied by a user during use of a vehicle to which the actuator is attached.

20

100. A dual function handlebar mounted actuator according to any one of the preceding claims further including a spindle mounted on the lever.

25 101. A dual function handle bar mounted actuator according to any one of the preceding claims including an actuator arrangement including a lever movable between a first and a second position and a master cylinder having a piston, said lever being arranged so that when it is moved towards said second position said piston is driven from an initial position to thereby increase pressure within
30 the master cylinder and wherein when said lever is released the pressure within the master cylinder is arranged to return the piston towards the initial position, said piston being returned fully to the initial position upon movement of the lever to the first position.

102. A dual function handle bar mounted actuator according to claim 101 further including an adjustor member connected between the lever and the master cylinder, said adjustor member being arranged to enable some free play between the movement of the lever and movement of the piston of the master
5 cylinder.

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